



Investigating the SDG 4 Framework: The (Non)Influence of Learning Styles on English Achievement in a Rural Islamic Elementary School

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ABSTRACT

Purpose of the study: The purpose of this study is to examine how fourth-grade children at MIN Bontolangkasa's visual, auditory, and kinesthetic learning styles affect their English learning outcomes.

Methodology: This quantitative correlational research used a learning style questionnaire (30 items) and documentation of English semester test scores. Data from 41 students were analyzed using descriptive statistics and simple linear regression with SPSS Version 22 software.

Main Findings: Visual learning was the most common method. Statistical study, however, revealed that learning styles had no discernible impact on English learning outcomes. The local language environment and consistent teaching techniques were thought to moderate the association between the average English score of 70.40 and.

Novelty/Originality of this study: When other contextual and pedagogical elements are more important, learning style theory may not be the main determinant of achievement, as demonstrated by the empirical data from a Madrasah Ibtidaiyah (Islamic elementary school) in rural Indonesia.

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1. INTRODUCTION

English has unquestionably become a crucial lingua franca due to the ubiquitous influence of globalization, which has made its incorporation into national educational systems around the world necessary [1]-[3]. Indonesia, responding to this imperative, has institutionalized English as a mandatory local content subject in elementary education, aiming to equip young learners with foundational communicative competencies for future academic and professional pursuits [4]-[6]. This policy underscores a national commitment to enhancing human capital within a competitive global arena. However, the effective implementation of this policy in diverse classroom contexts remains a significant pedagogical challenge, particularly in addressing the inherent heterogeneity of learners.

This national effort aligns with the global commitment to Sustainable Development Goal 4 (SDG 4), which aims to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (). A core tenet of achieving equitable quality education is addressing learner diversity and ensuring that pedagogical practices do not inadvertently create or widen learning disparities (SDG 4.5). In this pursuit, the

concept of learning styles has been widely promoted as a tool for inclusive and differentiated instruction, potentially offering a pathway to tailor education to individual needs. However, the uncritical application of such theories, especially in under-researched and unique educational settings like Indonesia's Madrasah Ibtidaiyah, risks overlooking more potent contextual barriers to quality education [7]-[9]. This study, therefore, situates itself within the SDG 4 agenda by empirically examining whether accommodating learning styles a popular proposed lever for educational equity holds significant influence on English learning outcomes in a specific, marginalized context [10], [11]. The findings aim to contribute to a more nuanced understanding of what truly drives 'quality education' in diverse environments, moving beyond universal prescriptions to context-sensitive strategies.

The cornerstone of effective pedagogy lies in recognizing and accommodating individual differences among students. Among the myriad psychological constructs influencing learning, learning style defined as a learner's characteristic and relatively consistent approach to perceiving, processing, and retaining information has garnered substantial attention from educators and researchers [12], [13]. The Visual, Auditory, and Kinesthetic model, as popularized by Usman et al [14], provides a pragmatic framework for categorizing these preferences. It posits that individuals have dominant channels for learning: visually through images and text, auditorily through sound and speech, and kinesthetically through movement and tactile experience. A substantial body of theoretical literature argues that instructional alignment with a student's predominant learning style can reduce cognitive load, increase engagement, and subsequently improve academic achievement [15]-[17]. Consequently, the diagnosis and accommodation of learning styles are frequently advocated as strategies for creating inclusive and differentiated classrooms.

However, empirical research on the connection between learning styles and academic performance paints a nuanced and perhaps contradictory picture. While numerous studies in various international and Indonesian contexts have reported positive correlations, affirming the pedagogical value of style-matched instruction [18]-[20], other research suggests the effect is modest or moderated by other variables such as intelligence, motivation, and the specific subject matter [21]-[23]. This ambiguity points to a critical research gap, the influence of learning styles is not universal but is deeply embedded within specific educational ecosystems. There is a pronounced scarcity of focused research within unique socio cultural and institutional settings like Indonesia's State Elementary Madrasah. These Islamic public elementary schools operate within a distinctive milieu, blending the national curriculum with religious values and often serving communities where local languages (e.g., Makassarese) are the primary medium of daily communication, not Indonesian, let alone English [24]-[26]. This linguistic environment, coupled with potentially resource-constrained teaching methodologies, creates a specific context that may significantly attenuate or reshape the expected impact of individual learning preferences.

Based on previous research, this study has gaps with the research conducted by Karmana [27] who discussed sustainable education within the framework of SDG 4 in the national context with a broad focus on policy implementation, curriculum, and systemic challenges; complementing Agustin's bibliometric analysis [28] which charted worldwide patterns in research on Education for Sustainable Development (ESD), highlighting the preponderance of higher education and suggesting its extension to the elementary level Likewise with Anggraeni et al.'s work [29] which looked at how sustainability concepts (such green chemistry and SDGs) could be incorporated into the particular content of science courses. The main gaps of this study lie in the very specific and unexplored objects, contexts, and research variables. The three previous studies focused on education for sustainability (ESD) as a content or policy objective, while this study investigates SDG 4 as an educational quality framework to analyze the influence of internal factors of the learning process, namely learning styles, on academic achievement, especially in English. Furthermore, this study fills a gap by situating it in a very specific and often overlooked context, namely Islamic elementary schools in rural areas, which differs from the broader focus of previous research on the national education system, higher education, or science learning at the secondary level [30], [31], [32]. Thus, this study bridges the gap between the macro discourse of sustainable education (SDG 4) and the unique micro practices of classroom learning, while also examining the relevance of a popular pedagogical construct (learning styles) in achieving educational quality goals in a specific socio-cultural and geographical environment.

By creating a fresh interdisciplinary connection between the micropedagogical variable of individual learning styles and the macro-framework of Sustainable Development Goal 4 (Quality Education), which has not been extensively examined in the literature to date, this study offers substantial originality [33]-[35]. While previous studies predominantly treat SDG 4 as a directive for curricular content on sustainability (e.g., environmental education) or systemic policy analysis, this study innovatively operationalizes it as an evaluative framework to assess educational quality in terms of equitable learning outcomes. The novelty is further amplified by its specific and underexplored context: a rural Islamic elementary school. This setting allows for a critical examination of how universal educational goals interact with localized socio cultural and religious infrastructures. Additionally, the study contributes a crucial empirical test to the long-standing pedagogical debate on the efficacy of learning styles, investigating its (non)influence on a concrete metric English achievement thereby moving beyond theoretical discourse to ground-level validation within a distinct educational ecosystem [36].

The implications of this study are multifaceted and impactful for theory, policy, and practice. Theoretically, it challenges and potentially refines the assumed universality of the learning styles theory by testing it in a non-Western, rural, and faith-based educational context, contributing to more culturally responsive pedagogical models [37], [38]. For policy, especially within the framework of SDG 4, the findings can inform more nuanced and context-sensitive strategies for improving educational quality in rural and Islamic schools across Indonesia and similar settings, moving beyond one size fits all approaches [39], [40]. Practically, it provides direct insights for teachers and curriculum developers in madrasahs and rural elementary schools. If learning styles are found to be non-influential, it would imply a need to redirect limited resources towards more evidence based pedagogical interventions and teacher training programs focused on effective language instruction rather than diagnostic learning style assessments. Conversely, any found influence would offer a lever for personalized teaching strategies to boost English proficiency.

The urgency of this research stems from a critical convergence of global agendas and localized educational disparities. As nations strive to meet the 2030 Sustainable Development Goals, there is an urgent need for granular, context-specific research that examines how the broad targets of SDG 4 translate into real classrooms, particularly in underserved communities like rural Islamic schools where resources are scarce and educational challenges are multifaceted. The persistent gap in English proficiency in rural Indonesia represents a significant barrier to students' future academic and economic mobility. Simultaneously, the pervasive yet scientifically contested application of learning styles theory in teacher training and classroom practice demands urgent empirical scrutiny to prevent the misallocation of effort and resources [40], [41]. In order to ensure that the pursuit of SDG 4 is both effective and efficient, this study is critically needed to produce actionable, evidence-based knowledge that can directly inform efforts to enhance the quality and equity of English education in some of the most important but under-researched educational settings.

Therefore, this study is situated at the intersection of educational psychology and contextual pedagogy [42]-[44]. It aims to investigate the effects of visual, auditory, and kinesthetic learning modalities on fourth-grade students' English language proficiency at State Elementary Madrasah Bontolangkasa, Kabupaten Pangkep, South Sulawesi. The study goes beyond a general application of learning style theory to examine its applicability and predictive capacity in a rural Islamic primary school, which is a particularly underrepresented educational setting. This study's originality and main contribution come from its purposeful contextual focus [45]. It probes whether the theoretically posited link between learning style and achievement is robust enough to manifest clearly amidst the potent contextual variables of a monolingual local language environment and standardized classroom practices. The findings are anticipated to advance the global conversation on SDG 4 by providing nuanced, context-bound evidence from a rural Islamic school. This challenges the uncritical transfer of pedagogical theories and offers critical insights for policymakers and practitioners aiming to achieve equitable quality education (SDG 4.5) in linguistically and culturally diverse settings, ensuring no learner is left behind.

2. RESEARCH METHOD

In order to examine the connection between students' learning styles and their English learning outcomes, this study used a quantitative correlational research approach. When analyzing the strength and importance of a relationship between two or more variables without changing them, a correlational design is suitable [46].

2.1. Design Research

This study used a quantitative correlational methodology to examine how students' learning styles and English proficiency relate to one another [47]. The three stages of the research process were preparation, data collecting, and analysis. Total sampling was used to gather information from all 41 fourth-graders at State Elementary Madrasah Bontolangkasa. A 30-item Visual, Auditory, and Kinesthetic questionnaire that was modified from accepted theory was used to examine the independent variable (learning style) [48], while the dependent variable (learning outcome) was derived from documented final English scores for the odd semester of the 2014/2015 academic year. Data analysis included descriptive statistics and inferential analysis using the Kolmogorov-Smirnov normality test and simple linear regression with SPSS Version 22 software [49].

2.2. Subject Research

The research was conducted at State Elementary Madrasah Bontolangkasa, South Sulawesi. The population comprised all 41 fourth grade students across three classes, and a total sampling technique was used, meaning the entire population was taken as the sample, as recommended for small populations ($N < 100$). The procedure began with a preparation phase involving a literature review and instrument preparation. This was followed by the data collection phase, where two primary instruments were deployed simultaneously: (1) a closed-ended learning style questionnaire, and (2) a documentation guide for collecting English achievement scores.

2.3. Instrument and Data Acquisition

A 30-item questionnaire modified from VAK theory was used to measure the independent variable, learning style (X) [50]. Ten items for visual, ten for auditory, and ten for kinesthetic preferences made up its three sub-scales. A 4-point Likert scale was employed for each item (Always = 4, Often = 3, Sometimes = 2, Never = 1). To reduce response bias, the questionnaire was designed with both positive and negative statements. Through a documentary analysis of school reports, the students' final English scores from the odd semester of the 2014–2015 academic year were operationalized as the dependent variable, learning outcome (Y). This objective metric is consistent with accepted methods for evaluating academic performance.

2.4. Data Analysis Technique

Software called SPSS Version 22 was used to analyze the data. There were two steps in the process. In order to characterize the features of both variables, descriptive statistics such as mean, median, mode, standard deviation, and frequency distribution were first computed. Based on the sub-scale with the highest average score, students were divided into three learning style categories: visual, auditory, and kinesthetic. Table 1 shows the distribution of students in various groups.

Table 1. Distribution of Learning Styles Among Students

Learning Style	Frequency (n)	Percentage (%)
Visual	22	53.7
Auditory	6	14.6
Kinesthetic	13	31.7
Total	41	100.0

Second, inferential analysis was conducted to test the hypothesis. A normality test using the Kolmogorov-Smirnov method was performed as a prerequisite for parametric testing [51]. The presence and extent of the learning style score's (X) influence on the English learning result score (Y) were then ascertained using a straightforward linear regression analysis. The significance level was established at $\alpha = 0.05$.

2.5. Research Procedure

The association between students' learning styles and their achievement in learning English was investigated in this study using a quantitative correlational design. This design is suitable for assessing the level of association between variables without experimental manipulation[52]. The research procedure followed a systematic three-phase structure, as illustrated in Figure 1.

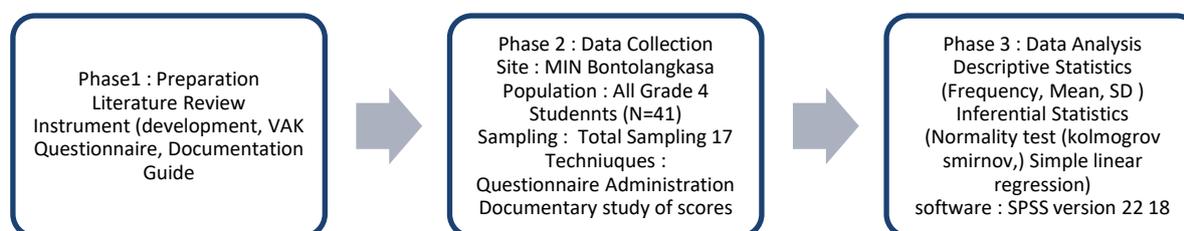


Figure 1. Research Procedure

3. RESULTS AND DISCUSSION

The impact of visual, auditory, and kinesthetic learning methods on fourth-grade students' English learning results at State Elementary Madrasah Bontolangkasa was examined in this study. A quantitative correlational technique was used in the study, and student report card paperwork and questionnaires were used to gather data. The research findings and a thorough discussion are presented in the ensuing sections.

3.1. Description of Research Data

3.1.1. Description of Learning Styles (Variable X)

A 30-item closed-ended questionnaire was used to collect learning style data from 41 fourth-graders. Three categories of learning styles—visual, auditory, and kinesthetic were intended to be identified by the questionnaire. When viewed through the prism of Sustainable Development Goal 4 (SDG 4), including its aims on equity (4.5) and quality (4.1), the study's non-significant finding is both illuminating and crucial. It implies that the lever of learning style accommodation might not be enough to remove more significant structural and environmental obstacles to equal English language attainment in the particular ecosystem of State Elementary Madrasah Bontolangkasa. Table 1 displays the descriptive analysis's findings.

Table 1. Statistical Summary of Learning Style

Statistic	Value
Mean	79.51
Median	78.00
Mode	74.00
Standard Deviation	5.86
Range	23.00
Minimum Score	70.00
Maximum Score	93.00

With a standard deviation of 5.86 and an average learning style score of 79.51, the students' scores were comparatively uniform around the mean. The learning styles of the students were grouped according to the ideal mean ($M_i = 75$) and ideal standard deviation ($SD_i = 15$), as indicated in Table 2.

Table 2: Learning Style Category Distribution

Category	Frequency	Percentage (%)
High	1	2.44
Moderate	29	70.73
Low	11	26.83
Very Low	0	0.00
Total	41	100

The majority of students (70.73%) had a moderate level of learning styles. Furthermore, based on the dominant learning style for each student (determined by the highest sub-score among visual, auditory, and kinesthetic), the distribution was as follows:

- Visual Learners: 22 students (53.66%)
- Kinesthetic Learners: 13 students (31.71%)
- Auditory Learners: 6 students (14.63%)

This indicates that visual learning style was the most dominant among the fourth-grade students at State Elementary Madrasah Bontolangkasa.

3.1.2. Description of Learning Outcomes (Variable Y)

The students' final English exam results for the odd semester of the 2014–2015 school year provided learning outcome statistics. Table 3 displays the findings of the descriptive analysis.

Table 3: Learning Outcome Variable (Y) Statistical Summary

Statistic	Value
Mean	70.40
Median	69.00
Mode	65.00
Standard Deviation	5.62
Range	15.00
Minimum Score	65.00
Maximum Score	80.00

The mean score for learning English was 70.40. The learning outcomes of the students were categorized as indicated in Table 4 using the ideal mean ($M_i = 72.5$), and ideal standard deviation ($SD_i = 2.5$), which were computed from the highest score (80) and lowest score (65).

Table 4. Distribution of Learning Outcome Categories

Category	Frequency	Percentage (%)
High	12	29.27
Moderate	1	2.44
Low	7	17.07
Very Low	21	51.22
Total	41	100

Notably, more than half of the students (51.22%) had learning outcomes in the "Very Low" category. This condition is suspected to be influenced by external factors such as the students' learning environment. Most

students use the Makassar language daily in family, school, and community interactions, which may hinder the habituation and practice of English [9].

3.1.3. Learning Outcomes and Learning Styles Recapitulation

Table 5 shows the correlation between the average learning outcome and the kind of learning style.

Learning Style	N	Minimum Score	Maximum Score	Mean Score
Visual	22	65.0	80.0	70.89
Auditory	6	65.0	75.0	69.67
Kinesthetic	13	65.0	80.0	69.92

Table 5 shows that the average learning outcomes for the three learning style groups were not significantly different. Visually dominant students had a slightly higher average (70.89) compared to auditory (69.67) and kinesthetic (69.92) learners. However, the difference is very small.

3.2. Hypothesis Testing and Discussion

3.2.1. Data Normality Test

A normality test was performed using SPSS Version 22 and the Kolmogorov-Smirnov method before the hypothesis was tested. Table 6 displays the outcomes.

Variable	Kolmogorov-Smirnov Statistic	Sig.
Learning Style (X)	0.114	0.200
Learning Outcome (Y)	0.211	0.010

If Sig. > 0.05, the data is considered to be regularly distributed, according to the decision criterion. The learning style variable (X) is normally distributed, as indicated by its Sig. value of 0.200 (> 0.05). With a Sig. value of 0.010 (< 0.05), the learning outcome variable (Y) has a non-normal distribution. The Central Limit Theorem, however, is applicable when the sample size is 41 ($N > 30$), enabling the implementation of parametric tests like regression analysis [53]. Thus, additional analysis can move forward.

3.2.2. Basic Analysis of Linear Regression

The hypothesis about the impact of learning styles (X) on English learning outcomes (Y) was tested using simple linear regression analysis. Table 7 provides a summary of the analysis findings.

Output	Value
Constant (a)	71.21
Regression Coefficient (b)	-0.010
Sig. of Regression Coefficient	0.948
R Square	0.000

Based on Table 7, the regression equation formed is:

$$Y = 71.21 - 0.010X \dots (1)$$

Where:

- **Y** = Predicted English Learning Outcome
- **X** = Learning Style Score
- **a (71.21)** = Constant, indicating the predicted learning outcome if the learning style score is zero.
- **b (-0.010)** = Regression coefficient, indicating that every one-unit decrease in learning style score is associated with a 0.010-unit *increase* in learning outcome. The negative sign shows a very weak and inverse relationship.

The regression coefficient's Sig. value is 0.948, which is significantly higher than 0.05. This results in the alternative hypothesis (H_a) being rejected and the null hypothesis (H_0) being accepted. Therefore, learning styles had no discernible impact on fourth-grade pupils' English learning outcomes at State Elementary Madrasah Bontolangkasa. Additionally, the variance in learning style scores accounts for 0% of the variation in English learning outcomes, according to the coefficient of determination (R Square), which is 0.000. Other factors not covered in this study have an impact on the remaining 100%.

3.2.3. Post Hoc Test (Multiple Comparisons)

Using the Tukey HSD method, a Post Hoc test was administered to groups of students with varying dominant learning styles to see if there were any changes in learning results. The findings demonstrated that all pairwise comparisons (Visual-Auditory = 0.890; Visual-Kinesthetic = 0.882; Auditory-Kinesthetic = 0.996) had Sig. values larger than 0.05. This demonstrates that children with visual, auditory, or kinesthetic learning styles do not significantly differ in their English learning outcomes.

The results of this study show that students' English learning outcomes are not significantly impacted by learning styles. This is in contrast to a number of theories that contend that learning results can be maximized by adapting instructional strategies to students' learning preferences [53]. Several factors may explain these results:

The learning process and outcomes are influenced by a complex set of factors, not just individual learning styles. These factors include instrumental inputs (curriculum, teacher competence, teaching methods, facilities) and environmental inputs (family, community, socio-cultural context) [54]. In the context of State Elementary Madrasah Bontolangkasa, environmental factors are suspected to play a more dominant role. The dominant use of the local language (Makassar) in daily life limits students' exposure and practice of English, which is crucial for foreign language acquisition [55]. This is supported by the finding that 51.22% of students had learning outcomes in the "Very Low" category.

The research suggests that the teaching methods applied in the classroom may not have been differentiated based on students' diverse learning styles. Teachers might have used uniform methods for all students. As a result, despite having different learning style preferences, students received the same kind of stimulation, preventing any one style group from showing superior outcomes. This aligns with the conclusion that the "one-size-fits-all" approach neutralizes the potential advantages of any specific learning style [56].

Learning a foreign language, especially for young learners, inherently involves multiple senses simultaneously (listening, seeing, speaking, writing, doing). Effective English language teaching (ELT) for young learners typically incorporates varied activities such as songs, games, stories, and physical movements [57], [58], [59]. These activities cater to visual, auditory, and kinesthetic modalities at once. Therefore, in a well-rounded language class, students of all learning style preferences can find elements that engage them, potentially leveling the outcome differences attributed solely to a single dominant style.

The learning outcomes in this study were measured solely using final semester exam scores (summative assessment) [60], [61]. This type of assessment may not fully capture the students' actual language proficiency, which includes communicative competence, fluency, and practical skills. A different assessment method (e.g., performance-based assessment or portfolio) might reveal correlations with learning styles that are not apparent through written exams.

This study underscores that the path to inclusive and equitable quality education (SDG 4) is not universal. In settings like State Elementary Madrasah Bontolangkasa, structural and environmental factors (linguistic landscape, teacher preparedness, assessment systems) may be more significant determinants of learning outcomes than individual learner preferences [62], [63]. Therefore, efforts to achieve SDG 4 must prioritize contextual diagnostics. Investing in teacher professional development (SDG 4.c) for multilingual pedagogy, creating English-rich environments beyond the classroom, and developing authentic, performance-based assessments might yield greater returns for educational quality and equity than focusing primarily on learning style inventories. It advocates for a balanced approach where understanding learner diversity is one part of a broader strategy to dismantle systemic barriers to learning.

There is a substantial discrepancy between the results of this study and those of earlier research. Studies carried out by Zakiya Qothrun Nada [64] the study "The Influence of Learning Styles on Student Learning Outcomes at the Junior High School Level" came to the solid conclusion that learning styles had a significant impact on Indonesian junior high school students' learning results. Three earlier pieces of literature are synthesized to support this conclusion [66]-[68] the majority of which found a positive and significant correlation between various learning styles (visual, auditory, kinesthetic) with learning outcomes in subjects such as Science, Social Studies, Aqidah Akhlak, and Mathematics. Similarly, a study by Ranindya Masyarah Gustiary [68] The study "The Relationship Between Learning Style and Gender on Mathematics Learning Outcomes" discovered no direct correlation between gender and learning outcomes, however it did find a strong association between learning style and mathematics learning results ($r=0.477$). In the meanwhile, M. Arif et al. [69] The study "Learning Styles and Creativity of Students in the Islamic Education Management Study Program" indirectly supported the idea that understanding learning styles is essential for achieving the best possible learning outcomes by confirming that three types of learning styles competitive, avoidant, and independent were found to be highly correlated with aspects of creativity like fluency and flexibility.

Findings that deviate from the consensus of the three previously listed studies constitute the research gap. While previous studies, particularly Nada (2025) and Gustiary (2020), have established the narrative that learning style is a significant determinant, this study finds that learning style does not significantly influence English language achievement in specific contexts. This gap lies not only in outcomes, but more fundamentally in paradigms and contexts. Previous studies have tended to focus on content subjects (Mathematics, Science, Social

Studies) and secondary or tertiary education contexts, relying on conventional summative assessments. In contrast, this study focuses on English as a foreign language learning in a rural Islamic elementary school setting, taking into account the SDG 4 framework that emphasizes inclusive, equitable, and quality education. These findings suggest that in unique socio-linguistic contexts (dominance of local languages, limited exposure to the target language) and with teaching approaches that may not yet be differentiated, individual "learning style" variables are apparently overridden by larger environmental and pedagogical factors. Thus, this study challenges the generalization of previous research findings and shifts attention from a solely learner's preference-based approach to a more holistic analysis of the learning ecosystem, in line with the principles of sustainability and equity in SDG 4.

This research introduces several significant novelties that distinguish it from previous studies. Firstly, it provides a crucial contextual counterpoint by challenging the predominantly accepted narrative of learning styles' significant influence within a specific, under researched setting: a rural Islamic elementary school (*Madrasah Ibtidaiyah*). While prior studies have largely been conducted in urban or general junior high school environments, this study shifts the focus to a unique socio-cultural and educational milieu where local language dominance (Makassarese) and specific religious institutional characteristics may fundamentally alter the dynamics of foreign language acquisition [70], [71]. Secondly, it innovatively integrates the Sustainable Development Goal 4 (SDG 4) framework as an analytical lens. Instead of merely examining the correlation between two variables, this study interrogates whether the common pedagogical prescription of catering to learning styles aligns with the SDG 4 principles of inclusive and equitable quality education in a resource-constrained environment. It questions if a focus on individualized learning styles is the most effective or equitable strategy for achieving foundational English proficiency (Target 4.1) in such a context. This conceptual integration of global education policy with a localized empirical investigation represents a substantial scholarly contribution [72]. Thirdly, the research highlights the primacy of environmental and instructional factors over psychological preferences in this specific case. By identifying that a "one-size-fits-all" teaching approach and limited linguistic exposure neutralize potential learning style advantages, the study offers a nuanced caveat to the learning styles theory, suggesting its applicability is not universal but is heavily mediated by contextual constraints. Thus, the novelty lies not in disproving the theory outright, but in delineating the boundary conditions under which it may or may not hold significant practical value for learning outcomes.

The findings carry important implications for multiple stakeholders in education. For teachers and school administrators in similar rural or linguistically isolated settings, the study implies that investing disproportionate effort in diagnosing and catering to individual learning styles may not yield the expected returns in English achievement. Instead, professional development efforts and resources might be more effectively channeled towards: (1) enhancing teachers' competence in employing multisensory, communicative language teaching methods that inherently benefit all learners (e.g., through songs, games, and TPR), and (2) strategizing ways to increase students' exposure and practice opportunities with the English language within and beyond the classroom. For curriculum developers and policymakers aiming to fulfill SDG 4 mandates, the research implies the need for context-sensitive pedagogical guidelines [73], [74]. Prescriptive policies advocating for learning-style differentiation must be balanced with support for foundational, context-appropriate teaching quality and resource allocation that addresses larger systemic barriers, such as linguistic environment and teaching materials. For theoretical discourse, the study implies that models of language acquisition and achievement must more rigorously incorporate macro-contextual variables as moderating or even overriding factors. It cautions against the direct application of theories developed in different settings without considering the ecological validity. Finally, for assessment practices, it implies the necessity of moving beyond summative exam scores to employ more comprehensive, performance-based assessments that might capture proficiencies and potential style interactions not visible in traditional tests.

This study is subject to several limitations that qualify its conclusions and point to directions for future research. The primary limitation is its specific and delimited context a single rural Islamic elementary school in Indonesia. While this allows for deep contextual analysis, the findings cannot be generalized to all elementary schools, urban settings, different subject matters, or other cultural environments without further investigation [75], [76]. The measurement of the dependent variable is another key limitation. Relying solely on final semester exam scores as a proxy for "English achievement" provides a narrow, likely cognitive and written-biased, snapshot of student proficiency. It fails to capture oral communicative competence, fluency, motivation, or affective outcomes, which might correlate differently with learning styles. The research design itself, being a non-experimental study, establishes association rather than causation. While it identifies that learning styles showed no significant effect, it cannot definitively rule out all potential causal pathways or interactions under different instructional conditions. Furthermore, the assessment of teaching methods was based on observation and inference; a more detailed analysis of the actual classroom practices and their alignment (or misalignment) with different styles would strengthen the claims about the "one-size-fits-all" approach. Finally, the study focuses on a limited set of learning style categorizations (e.g., VAK). Future research could explore more complex models of learning preferences or

include other learner variables (e.g., motivation, self-regulation) to paint a more complete picture of their interplay with environmental factors in determining learning outcomes in similar contexts.

In conclusion, this study found that, in the particular context of State Elementary Madrasah Bontolangkasa, identifying students' learning styles is not a determining factor for English learning outcomes, even though it is valuable for teacher awareness and can help create a more varied and engaging learning environment. To improve English learning outcomes, a more comprehensive approach is needed, focusing on improving teaching quality, enriching language exposure, creating a supportive learning environment, and involving parents and the community. Future research could employ mixed methods to explore in-depth how teaching methods in the classroom interact with student learning styles and involve other outcome variables such as learning motivation or communication skills.

4. CONCLUSION

The study concluded that the visual, auditory, and kinesthetic learning methods of the children at State Elementary Madrasah Bontolangkasa had no discernible impact on their English learning outcomes, thereby refuting the original hypothesis. The results indicate that in this specific context, factors such as the linguistic environment, uniform teaching methods, and the multisensory nature of language learning itself likely play a more substantial role than individual style preferences. These findings suggest a shift in practical focus from style-based instruction toward enhancing overall teaching quality and enriching the learning ecosystem. Prospects for further research include exploring the dominant environmental and instructional factors affecting achievement, employing longitudinal or experimental designs to test style-matching interventions under controlled conditions, and utilizing broader, performance-based assessment metrics to gain a more comprehensive understanding of language learning outcomes. In conclusion, this study, framed within the pursuit of SDG 4 (Quality Education), found no significant influence of students' learning styles. The results provide an important caveat for the global education community: achieving equitable learning outcomes (SDG 4.5) requires moving beyond popular yet potentially limited psychological constructs to address the deeper contextual and systemic factors that define a child's learning ecosystem.

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USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY

The authors declare that no artificial intelligence (AI) tools were used in the preparation, analysis, or writing of this manuscript. All aspects of the research, including data collection, interpretation, and manuscript preparation, were carried out entirely by the authors without the assistance of AI-based technologies.

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